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Mineral Industry Surveys

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NICKEL IN NOVEMBER 2002

In November, reported domestic nickel consumption on a daily average basis was 6% less than that of October, according to the U.S. Geological Survey. Average daily nickel consumption of cathode, pellets, briquets, and ferronickel for stainless steel was 73.7 metric tons per day (t/d)—2% greater than the 72.1 t/d for October and 27% greater than the 57.8 t/d (revised) for November 2001. Consumption of elemental nickel to make nickel-base corrosion-resistant alloys was 10% less than the corresponding tonnage reported for October. The 10% decrease for corrosion-resistant alloys more than offset the 2% increase in consumption for stainless steel. Sales to plating companies averaged 26.9 t/d, about 10% less than the October sales figure. Total consumption for the first 11 months of 2002 was down 12% from the 78,700 t reported for the corresponding period of 2001.

On November 30, U.S. consumer stocks of cathode, pellets, briquets, and powder totaled 1,780 t—10% less than the 1,970 t for October 31 and 11% less than the 1,990 t reported for yearend 2001. Stocks in London Metal Exchange (LME) warehouses worldwide totaled 20,154 t—5% less than the tonnage on October 31. LME stocks were 124% greater than on March 31, 2001, when they bottomed out at 9,000 t after a 16-month slide. Preliminary data collected by the International Nickel Study Group indicated that, at the end of October 2002, world nickel producers (excluding those in Austria, China, the former Yugoslavia, and the Ural area of Russia) had approximately 90,200 t of nickel in primary products in stock, of which 61,900 t or 69% were Class I materials. Class I materials are refined products with a nickel (Ni) content of 99% or greater (electrolytic cathode, pellets, briquets, rondelles, powder, etc.). Class II materials include ferronickel, oxide sinter, and East Asian utility nickel—products with a Ni content less than 99%.

Percentages reported in the above paragraphs may not be verifiable owing to concealment of individual company proprietary data and late reporting of data.

The United States imported 104,000 t of primary nickel in the first 10 months of 2002, 17% less than the 125,000 t for the corresponding period of 2001. Class I materials accounted for 86% of total primary imports received during the first 10 months of 2002. Trade data for November 2002 will appear in a subsequent report.

The Sudbury Igneous Complex of Ontario—New investigations and geologic interpretations of the associated copper-nickel deposits

In 1883, a crew constructing the Canadian Pacific Railway discovered the first of numerous magmatic sulfide deposits located around the periphery of the Sudbury Basin in east-central Ontario (Giblin, 1984). Since then, more than 10 million metric tons (Mt) of nickel have been recovered from the mining district (Lesher and Thurston, 2002). The Sudbury district is also an important source of copper, cobalt, and platinum-group elements (PGE). The copper content of the typical Sudbury ore is approximately equal to the nickel content. In 2001, the Sudbury operations of Falconbridge Limited processed 1.95 Mt

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of local ores with an average grade of 1.61% nickel and 1.35% copper (Falconbridge Limited, 2002, p. 20). Inco Limited, Sudbury's other principal nickel producer, had equivalent ore grades of 1.57% nickel and 1.68% copper that year (Inco Limited, 2002, p. 19).

At least 10 copper-nickel deposits have been discovered along the margins of the Sudbury Basin since 1990. Three recent discoveries—at Kelly Lake, Nickel Rim South, and Totten—have spurred the expansion of exploration activities (Falconbridge Limited, 2002§[1]; Inco Limited, 2000a§, b§).

In November 2002, the Society of Economic Geologists published a special issue devoted to the mineral deposits of the Sudbury Basin. This special issue supplements and updates four earlier special volumes and numerous other landmark publications dealing with the igneous complex. Many aspects of the complex's geologic history are still being debated despite more than a century of field work and laboratory studies. The most recent evidence continues to support the theory that the Sudbury structure is an impact crater created when a meteorite struck the Canadian Precambrian Shield ~1.85 billion years (Ga) ago (Therriault, Fowler, and Grieve, 2002).

The bulk of the sulfide ores are found intermittently along the base of the Sudbury Igneous Complex as complex mixtures of sulfide assemblages, xenoliths, and impact breccias. The principal sulfide minerals, in order of decreasing abundance, are pyrrhotite (Fe_{1-x} S), pentlandite ($(Fe,Ni)_9S_8$), chalcopyrite ($CuFeS_2$), pyrite (FeS_2), and bornite (Cu_5FeS_4) (Beswick, 2002; Magyarosi, Watkinson, and Jones, 2002).

Several papers in the special issue focus on the long, radial offset dikes which extend outward from the Sudbury structure into the much older Archaean and Paleoproterozoic Huronian Metasedimentary rocks (2.5 to 2.2 Ga). Radiometric dating of the dike rocks indicates that they were formed about 1.8 Ga ago and are apparently related to the melt generation processes triggered by the impact. At least 9 major offset dikes have been mapped. The Foy offset dike is the largest of the dikes radiating outward from the Sudbury Igneous Complex. The dike extends into the country rock for at least 30 kilometers (km). Sulfides occur within the dike primarily as disseminated, blebby masses—usually as inclusions within quartz diorite (Tuchscherer and Spray, 2002). A second dike, the Whistle-Parum dike—is located on the northeast perimeter of the basin , northwest of Lake Wanapitei. The 12-km-long radial dike and associated embayment are comprised of numerous rock types, including mafic sulfide-bearing breccia and inclusion-bearing quartz diorite (Murphy and Spray, 2002). A third dike, the Worthington dike, extends from the southwest margin of the igneous complex for about 15 km. The dike consists of a core of quartz diorite containing inclusions of amphibolite and semimassive to massive sulfide assemblages. In some places, the dike is 50 to 80 meters (m) in width (Lightfoot and Farrow, 2002).

The special issue also deals with the metallogenesis and geology of several much older (2.5 Ga) mafic intrusive complexes that formed in the Sudbury area long before the impact event. Two of these complexes—the East Bull Lake intrusion and the River Valley intrusion—are current exploration targets for PGE and could be sources of byproduct nickel. (James, Easton, Peck, and Hrominchuk, 2002). (See Nickel in December 2001.) Some investigators have suggested that similar mafic intrusives may have been present at Sudbury when the meteorite struck and served as protores for the nickel-copper-PGE mineralization of the Sudbury Igneous Complex.

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[1]References that include a section twist (§) are found in the Internet References Cited section.

TABLE 1
CONSUMPTION OF NICKEL (EXCLUSIVE OF SCRAP), BY FORM AND USE 1/

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder	Ferronickel	Oxide-sinter, salts, and other forms	Total	Total year to date
2001:					
November	5,000	608	323	5,930	78,700
December	4,460	537	215	5,210	83,900
January-December	71,300	10,100	2,500	83,900	XX
2002:					
January	5,080	774	292	6,150	6,150
February	5,000	890	281	6,170	12,300
March	5,030	723	375	6,130	18,500
April	5,370	879	286	6,540	25,000
May	5,030	722	87	5,840	30,800
June	5,450	873	261	6,580	37,400
July	5,510	730	272	6,510	43,900
August	5,530	843	236	6,610	50,500
September	5,430	754	65	6,250	56,800
October	5,620	750	68	6,440	63,200
November:					
Steel:					
Stainless and heat resisting	1,580	632	W	2,210	26,500
Alloy (excludes stainless)	164	--	--	164	2,690
Superalloys	1,300	--	W	1,300	13,600
Copper-nickel alloys	W	--	--	W	W
Electric, magnetic, and expansion alloys	13	--	--	13	124
Other nickel & nickel alloys	W	--	W	W	W
Cast iron	W	--	--	W	W
Electroplating (sales to platers)	807	--	--	807	10,300
Chemical and chemical uses	W	--	--	W	W
Other uses	1,270	--	64	1,330	15,800
Total reported	5,130 2/	632	64	5,830	69,100
Total all companies (calc) 3/	XX	XX	XX	8,310	98,500
2002: January-November	58,200	8,570	2,290	69,100	XX
2001: January-November	66,800	9,590	2,280	78,700	XX

W Withheld to avoid disclosing company proprietary data; included in "Other uses" category. XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Of consumption, 4,050 metric tons were consumed as cathodes and pellets, the remainder as briquets and powder.

3/ Figures represent calculated apparent consumption; based on the revised proportion of reported primary consumption (70.11%) to apparent primary consumption for 2000.

TABLE 2
ENDING STOCKS OF NICKEL (EXCLUSIVE OF SCRAP) HELD BY CONSUMERS,
BY FORM AND USE 1/ 2/

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder	Ferronickel	Oxide-sinter, salts, and other forms	Total
2001:				
November	2,480	330	198	3,010
December	1,990	522	289	2,800
2002:				
January	1,800	832	282	2,920
February	2,110	454	106	2,670
March r/	2,340	494	135	2,970
April	2,490	513	94	3,100
May	2,250	82	127	2,460
June	1,840	63	138	2,040
July	1,580	98	98	1,770
August	1,910	112	84	2,100
September	2,370	89	78	2,530
October	1,970	140	76	2,180
November:				
Steel (stainless, heat resisting and alloy)	700	(3/)	(3/)	700
Nonferrous alloys 4/	1,060	(3/)	(3/)	1,060
Foundry (cast irons)	(3/)	--	(3/)	(3/)
Chemical (catalysts, ceramics, plating salts, etc.) and unspecified uses	21	93	85	199
Total	1,780	93	85	1,960

r/ Revised. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Stocks held by companies that consume nickel in more than one end use category are credited to the major category. Stocks are subject to revisions owing to inventory adjustment.

3/ Included in the "Chemical and unspecified uses" category.

4/ Includes superalloys, nickel-copper and copper-nickel alloys, permanent magnet alloys, and other nickel alloys.

TABLE 3
CONSUMPTION AND ENDING STOCKS OF PURCHASED SECONDARY NICKEL, BY USE 1/

(Metric tons, nickel content)

	Consumption			Stocks		
Period	Ferrous scrap 2/	Nonferrous scrap 3/	Total scrap	Ferrous scrap 2/	Nonferrous scrap 3/	Total scrap
2001:						
November	3,970	829	4,800	3,330	92	3,420
December	3,950	784	4,730	3,750	93	3,840
January-December	55,100	11,300	66,400	XX	XX	XX
2002:						
January	4,950 r/	784	5,740 r/	3,180	86	3,270
February	4,870 r/	810	5,680 r/	3,140 r/	88	3,230 r/
March	5,150 r/	767	5,920 r/	2,950 r/	102	3,050 r/
April	5,180 r/	740	5,920 r/	2,980	109	3,090
May	5,020	620	5,640	3,690	97	3,790
June	6,380 r/	549	6,930 r/	3,300 r/	103	3,410 r/
July	5,950	713	6,660	3,280 r/	97	3,380 r/
August	6,110 r/	685	6,790 r/	3,110	105	3,210
September	4,820	621	5,440	3,400	110	3,510
October	5,210	647	5,860	3,540	101 r/	3,640
November	4,640	531	5,170	3,240	89	3,330
2002- January-November	58,300	7,470	65,800	XX	XX	XX
2001- January-November	51,100	10,500	61,700	XX	XX	XX

r/ Revised. XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Nickel content is calculated from an average nickel content and the reported gross weight of scrap.

3/ Combined consumption and stocks of aluminum-base, copper-base, and nickel-base scrap.

TABLE 4
U.S. IMPORTS FOR CONSUMPTION OF NICKEL, BY COUNTRY 1/

(Metric tons, nickel content) 2/

Period and country of origin	Cathodes, pellets, and briquets	Powder and flakes	Ferro-nickel	Metal-lurgical-grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total 3/	Total year to date 4/	Wrought nickel
2001:										
October	11,200	617	160	263	434	265	279	13,200	122,000	142
November	9,160	434	1,330	162	429	174	322	12,000	134,000	54
December	8,360	640	707	188	344	193	276	10,700	144,000	95
January-December	111,000	8,310	11,600	1,350	5,580	3,180	3,200	144,000	XX	1,140
2002:										
January	6,550	597	446	400	443	283	244	8,960	8,960	74
February	11,900	428	620	128	341	235	235	13,900	22,900	109
March	5,760	813	679	54	315	275	277	8,180	31,000	30
April	6,220	551	983	--	221	349	274	8,590	39,600	116
May	6,600	590	1,240	14	222	478	297	9,450	49,100	53
June	8,950	391	1,160	238	174	460	228	11,600	60,700	43
July	11,800	627	1,080	214	367	874	225	15,200	75,900	69
August	7,750	602	1,790	127	152	762	171	11,400	87,200	72
September	13,000	566	1,570	2	160	641	194	16,200	103,000	85
October:										
Australia	554	20	--	11	--	--	23	608	8,480	--
Brazil	42	--	--	--	--	--	--	42	725	--
Canada	3,650	395	--	--	77	348	1	4,470	50,000	--
Colombia	--	--	242	--	--	3	--	245	2,210	--
Dominican Republic	--	--	564	--	--	--	--	564	5,510	--
Finland	440	54	--	--	--	--	11	505	3,510	--
France	164	--	--	--	42	4	12	222	2,160	3
Germany	20 5/	31	--	--	21	--	32	104	1,400	62
Japan	--	1	1	(6/)	9	(6/)	20	31	420	7
Mexico	--	--	--	--	5	169	--	174	1,140	--
New Caledonia	--	--	200	--	--	--	--	200	800	--
Norway	119	--	--	--	--	--	--	119	6,250	--
Russia	70	77	--	--	--	--	--	147	23,400	--
South Africa	--	--	--	--	--	--	--	--	298	--
Sweden	--	(6/)	--	--	--	--	--	(6/)	43	--
United Kingdom	3	22	--	--	60	2	7	94	884	--
Venezuela	--	--	--	--	--	23	--	23	1,660	--
Zimbabwe	60	--	--	--	--	--	--	60	1,000	--
Other	17 5/	9	--	--	16	15	76	133	1,290	34
Total	5,140	609	1,010	11	230	564	182	7,740	111,000	106
2002: January-October	83,700	5,770	10,600	1,190	2,620	4,920	2,330	111,000	XX	758
2001: January-October	93,700	7,230	9,560	998	4,810	2,810	2,600	122,000	XX	986

XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemical category includes chlorides (25%), sulfates (22%), and other salts (22%), supported catalysts (22%), and oxide, sesquioxide and hydroxide (65%).

3/ Excludes wrought nickel.

4/ May include revisions for prior months.

5/ All or part of these data have been referred to the Census Bureau for verification.

6/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 5
U.S. EXPORTS OF NICKEL, BY COUNTRY 1/

(Metric tons, nickel content) 2/

Period and country of destination	Cathodes, pellets, and briquets	Powder and flakes	Ferro-nickel	Metal-lurgical-grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total 3/	Total year to date	Wrought nickel
2001:										
October	170	90	14	142	1,740	2,680	346	5,180	49,900	177
November	158	85	--	132	1,100	1,350	148	2,970	52,900	124
December	125	72	(4/)	131	1,290	2,310	198	4,130	57,000	163
January-December	1,400	1,380	50	1,940	15,700	32,900	3,680	57,000	XX	2,400
2002:										
January	344	135	6	122	1,110	1,030	233	2,990	2,990	192
February	170	81	3	152	989	3,720	229	5,350	8,330	167
March	245	151	(4/)	64	1,470	2,040	219	4,190	12,500	262
April	187	113	--	67	1,280	3,890	226	5,770	18,300	139
May	65	119	10	111	1,360	1,900	213	3,780	22,100	271
June	105	134	(4/)	19	1,550	2,500	155	4,470	26,500	283
July	131	140	1	9	1,560	2,040	204	4,080	30,600	200
August	77	222	1	42	826	1,510	168	2,840	33,400	230
September	164	122	3	55	718	1,660	153	2,880	36,300	249
October:										
Australia	(4/)	(4/)	--	--	--	--	--	(4/)	81	--
Belgium	--	--	--	--	--	--	--	--	338	--
Canada	2	8	--	16	837	231	23	1,120	12,200	2
China	--	(4/)	8	--	--	431	6	445	4,360	4
France	--	10	--	--	--	1	1	12	309	77
Germany	--	7	--	10	78	--	3	98	986	2
India	--	--	--	--	--	80	--	80	907	--
Italy	--	(4/)	--	--	--	1	--	1	50	(4/)
Japan	--	12	--	2	35	22	10	81	1,600	(4/)
Korea, Republic of	--	(4/)	--	--	--	53	39	92	6,210	1
Mexico	92	3	--	--	--	3	12	110	1,430	85
Netherlands	--	1	--	--	--	--	2	3	659	--
South Africa	--	--	--	3	17	--	3	23	44	--
Spain	--	--	--	--	--	--	--	--	676	--
Sweden	--	41	--	--	32	6	13	92	607	--
Taiwan	--	(4/)	--	--	4	918	4	926	7,470	1
United Kingdom	--	2	(4/)	3	7	78	1	91	520	24
Other	19	15	(4/)	--	--	19	50	103	1,170	25
Total	113	99	9	34	1,010	1,840	167	3,270	39,600	221
2002: January-October	1,600	1,310	31	676	11,900	22,100	1,970	39,600	XX	2,210
2001: January-October	1,120	1,220	50	1,680	13,300	29,200	3,340	49,900	XX	2,120

XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemical category includes chlorides (25%), sulfates (22%), and other salts (22%), supported catalysts (22%), and oxide, sesquioxide and hydroxide (65%).

3/ Excludes wrought nickel.

4/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF NICKEL ALLOYS, BY COUNTRY 1/

(Metric tons, gross weight)

Period and country of origin	Unwrought alloyed ingot	Bars, rods, and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total	Total year to date
2001:									
October	321	271	452	312	1	234	182	1,770	17,300
November	341	268	467	122	(2/)	153	143	1,490	18,800
December	350	354	342	300	1	140	126	1,610	20,400
January-December	4,110	3,860	5,030	3,070	15	2,600	1,770	20,400	XX
2002:									
January	353	231	399	329	--	203	155	1,670	1,670
February	183	177	408	227	1	248	154	1,400	3,070
March	256	207	407	293	(2/)	327	159	1,650	4,720
April	390	229	531	254	(2/)	233	151	1,790	6,510
May	179	248	456	289	1	337	162	1,670	8,180
June	232	294	401	287	15	511	122	1,860	10,000
July	133	259	624	361	31	124	196	1,730	11,800
August	170	215	360	356	34	179	161	1,480	13,200
September	65	153	412	207	35	244	131	1,250	14,500
October:									
Australia	40	--	--	--	--	--	--	40	911
Belgium	9	4	22	--	--	--	--	35	148
Canada	--	(2/)	--	--	(2/)	2	3	5	186
China	--	--	4	--	1	--	4	9	211
France	--	4	74	--	--	2	1	81	971
Germany	3	57	106	102	26	82	9	385	5,600
Italy	--	51	3	--	(2/)	2	(2/)	56	642
Japan	6	--	2	--	--	2	3	13	1,500
Mexico	--	--	--	--	--	--	82	82	813
Netherlands	--	--	--	--	--	--	1	1	49
South Africa	20	--	--	--	--	--	--	20	295
Sweden	(2/)	--	163	9	--	9	(2/)	181	2,170
United Kingdom	45	26	12	101	--	5	1	190	1,630
Other	57	8	14	--	1	2	13	95	558
Total	180	150	400	212	28	106	117	1,190	15,700
2002: January-October	2,140	2,160	4,400	2,820	147	2,510	1,510	15,700	XX
2001: January-October	3,420	3,230	4,220	2,650	14	2,310	1,500	17,300	XX

XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. EXPORTS OF NICKEL ALLOYS, BY COUNTRY 1/

(Metric tons, gross weight)

Period and country of destination	Unwrought alloyed ingot	Bars, rods, and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total	Total year to date
2001:									
October	1,300	601	171	770	13	107	950	3,910	30,500
November	1,190	641	135	623	23	124	333	3,070	33,600
December	954	591	82	404	7	164	160	2,360	36,000
January-December	13,400	7,890	1,660	7,030	146	1,900	3,970	36,000	XX
2002:									
January	861	599	93	572	9	134	247	2,520	2,520
February	808	600	106	596	43	115	340	2,610	5,120
March	884	626	178	505	11	197	653	3,050	8,180
April	618	451	96	476	12	204	278	2,140	10,300
May	862	495	99	638	32	136	297	2,560	12,900
June	1,070	393	142	567	8	127	363	2,670	15,500
July	437	518	94	392	8	144	307	1,900	17,400
August	951	527	142	545	15	128	426	2,730	20,200
September	788	568	174	733	4	133	333	2,730	22,900
October:									
Australia	43	--	2	--	--	3	2	50	615
Belgium	--	27	2	17	--	--	1	47	1,280
Canada	5	56	30	49	2	61	50	254	2,370
France	71	80	1	30	(2/)	(2/)	11	193	3,250
Germany	56	22	7	39	(2/)	3	10	138	3,220
India	--	(2/)	(2/)	(2/)	--	--	(2/)	1	93
Ireland	--	--	19	2	--	(2/)	(2/)	22	59
Italy	38	8	(2/)	86	(2/)	1	3	136	1,260
Japan	13	13	6	53	--	1	3	89	874
Korea, Republic of	11	3	1	20	--	1	6	42	591
Mexico	(2/)	3	50	5	--	68	62	188	2,600
Netherlands	--	(2/)	--	2	--	--	1	3	59
Singapore	1	--	(2/)	6	--	5	11	22	167
Spain	13	3	--	1	(2/)	2	2	21	70
Sweden	--	32	--	6	--	1	(2/)	39	312
Switzerland	7	1	4	20	--	2	(2/)	34	564
Taiwan	(2/)	17	--	30	--	3	1	51	371
United Kingdom	11	159	8	312	(2/)	11	2	503	4,180
Other	22	83	16	39	1	25	155	336	3,160
Total	290	507	146	717	3	187	320	2,170	25,100
2002: January-October	7,560	5,280	1,270	5,740	144	1,510	3,570	25,100	XX
2001: January-October	11,200	6,660	1,440	6,000	116	1,610	3,470	30,500	XX

r/ Revised. XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 8
NICKEL CONSUMPTION IN CAST AND WROUGHT PRODUCTS

	Percent	
	Wrought	Cast
November 2002:		
Stainless and heat resisting steels	79	21
Alloy steels	98	2
Superalloys	84	16
Copper-nickel alloys	96	4
Other nickel-base alloys	100	(1/)

1/ Less than 1/2 unit.

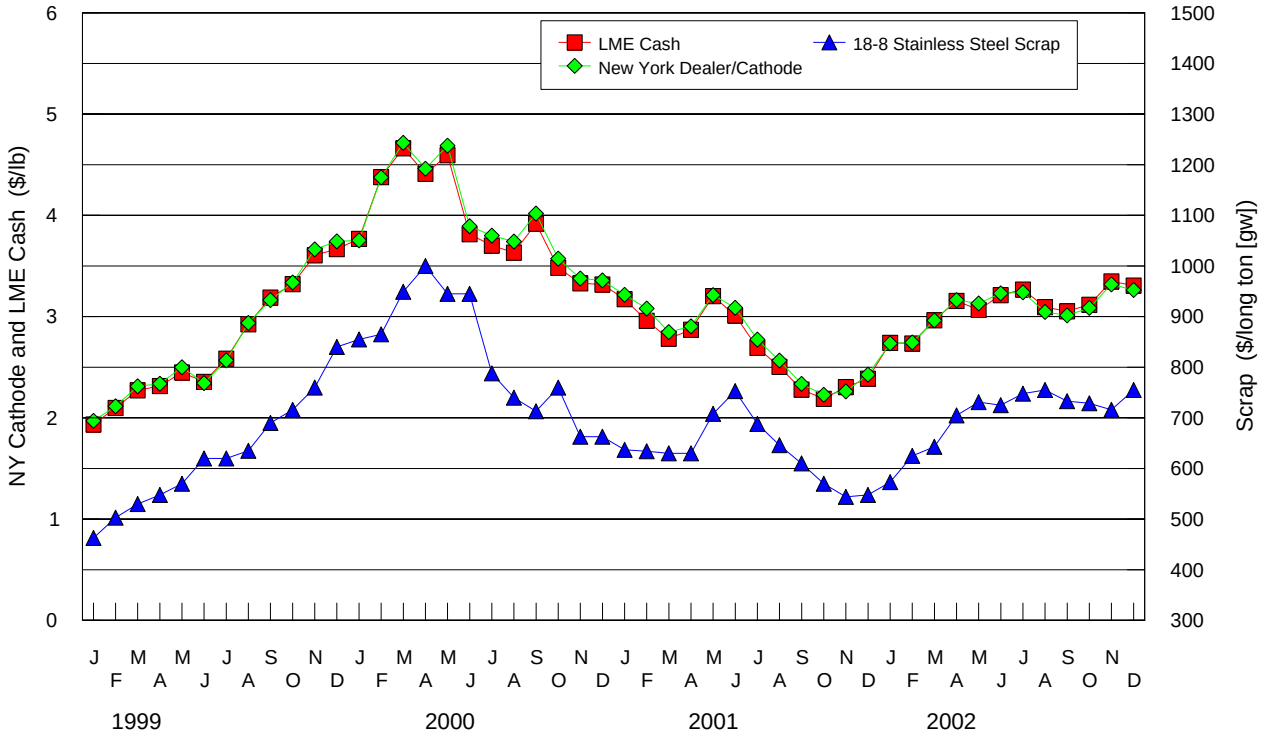
TABLE 9
NICKEL PRICES

Date	Cathode NY Dealer $/lb.	LME Cash $/t	LME Cash $/lb.	18/8 Stainless steel scrap Pittsburgh $/long ton(gw)
2002:				
Average for week ending:				
November 1	3.33-3.40	7,235.000	3.282	720-735
November 8	3.34-3.47	7,342.000	3.330	700-725
November 15	3.32-3.43	7,228.000	3.279	700-725
November 22	3.31-3.47	7,306.000	3.314	700-725
November 29	3.43-3.48	7,389.500	3.352	700-725
December 6	3.47-3.51	7,375.500	3.345	700-725
December 13	3.30-3.36	7,161.500	3.248	745-765
December 20	3.16-3.33	7,052.000	3.199	745-765
December 27	3.30-3.37	7,217.500	3.274	745-765
Average for month of:				
January	2.736	6,043.182	2.741	573
February	2.745	6,029.250	2.735	625
March	2.963	6,537.500	2.965	643
April	3.163	6,958.214	3.156	705
May	3.130	6,761.364	3.067	731
June	3.213	7,119.861	3.230	725
July	3.268	7,142.717	3.240	748
August	3.094	6,717.143	3.047	755
September	3.053	6,640.238	3.012	733
October	3.118	6,804.457	3.086	729
November	3.349	7,313.929	3.318	716
December	3.308	7,193.158	3.263	755

Source: Platts Metals Week and American Metal Market.

1999-2002 AVERAGE MONTHLY PRICES

(Derived from Metals Week and American Metal Market quotations)



1999-2002 STOCKS